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THE IDENTIFICATION OF THE MARBLES USED IN GREEK SCULPTURE

IN the science of archaeology, the determination of the provenance of the various objects which form part of its subject-matter, is of the highest importance. Other considerations apart, the knowledge of the place of origin of a given piece of sculpture, or even of the source whence its material is derived, may furnish us with a clue to the sculptor or school which produced it. In the case of marble sculpture, especially, the opinion is commonly held that, from examination of the material, fairly trustworthy conclusions may be drawn as to its source.

In talking the matter over recently with an archaeological friend,¹ it was suggested to me, who, though a petrologist, have taken, and still take, much interest in archaeological matters, that it would be of value to explain to archaeologists, who, it may be assumed, know little or nothing of petrography, the principles on which such conclusions rest, the methods of examination of a given specimen, and how great a degree of confidence may be placed in the identification of the source of the material of a statue. I shall confine myself to the marbles, both on account of their importance as artistic material, and because a discussion of them will elucidate many of the principles involved.

This discussion seems the more called for since it is the opinion of some archaeologists, in which the writer concurs,

¹ Mr. Edward Robinson, to whom I am indebted, as well as to Professors J. R. Wheeler and F. B. Tarbell, for kindly advice and criticism.

that too much confidence has been placed in such identifications. These have, in nearly all cases (with the exception of Lepsius's work), been made with no adequate knowledge of the facts or methods necessary for correct judgment, and, in certain instances, have led to the holding of diametrically opposed views by leading authorities, as in the cases of a Satyr in the Louvre,¹ and the Medici Torso² in the *École des Beaux Arts*.

By far the most important work which has been done that aims at the identification of the localities of marbles by means of scientific methods, is that of Lepsius.³ In this he discusses the marbles of Greek quarries and of the sculptures in the Athenian and other Greek museums, from a petrographical standpoint, and his paper has deservedly had great influence with all archaeologists. But, while I cannot speak with the authority of Dr. Lepsius, who had many opportunities for the study of Greek marbles and made excellent use of them, and while I recognize the high character of his work and its utility if judiciously applied, yet it seems to me that too much stress has been laid on this work in applying similar ideas elsewhere, and that general conclusions have been drawn by others which are not warranted by the facts, or by the principles involved. Archaeologists, either forgetting or not knowing the detailed character of the work done by Lepsius, and the necessity of such work for these investigations, have been inclined to use a rule of thumb method in dealing with the place of origin of marbles. To state the case broadly, any large-grained, highly translucent marble is put down as Parian, or, at least, Island marble; one that is finer grained but translucent, especially if weathering with a yellow tone, is called Pentelic; while a very fine-grained, snowy-white marble is called Carrara. Now it cannot be denied that such identifications may be, and often are, correct, but again — and this is the contention of this paper — they may not be, and it is

¹ Brunn, *Deutsche Rundschau*, XXXI, 1882, pp. 200 ff.; Furtwängler, *Masterpieces* (Eng. ed.), p. 330.

² Friederichs-Wolters, *Gipsabgüsse*, 476; Furtwängler, *Intermezzi*, p. 18.

³ Lepsius, *Griechische Marmorstudien*, Berlin, 1890.

surely unscientific and unwise to act upon the assumption that one of two views is correct, when either may be.

Let us now see what marble is, that we may be in a better position to discuss the matter.

Rocks, to begin at the beginning, may be formed in one of several ways. They may result from the solidification of molten material, *e.g.* lavas, basalt, granite, and diorite. They may be formed by the deposition of water-borne sediment, and the subsequent action of hardening and consolidating processes (physical and chemical), as clay slates, sandstone, and pudding-stone, or by the consolidation of loose material, as tuffs and breccias. They may be the product of vegetable or animal growth, as coal, chalk, and limestone. Again, they may result from the precipitation of matter from solutions, as many iron ores, travertines, and vein rocks. Lastly, all of these kinds of rocks may be changed by great pressure and heat very radically both in chemical and mineralogical composition, as well as still more in physical structure. In these cases, the rock mass generally becomes more crystalline, and a laminated structure is often produced, such as we see in the schists and gneisses.

Such changes, which geologists call metamorphic, may be brought about in one of two ways. A mass of molten, igneous rock may break up through overlying beds, metamorphosing the latter, this action being due largely to the heat, as well as to certain chemical reactions which it is unnecessary to explain here. The change in these cases of local or contact metamorphism is comparatively limited in extent. The second kind, which is known as regional metamorphism, is due largely to the great heat and pressure produced during movements in the earth's crust. The earth is a cooling body, according to general belief, and, as it cools, it contracts. In the readjustment, the crust over large areas is squeezed, cracked, folded, and contorted to an extent which is almost incredible to the layman, who regards rocks as rigid bodies, incapable of being squeezed, folded, and made to flow like wax in the fingers.

Now to come back to our marbles. These are composed essentially of grains of crystalline calcite (calcium carbonate), with smaller amounts of other matter. They belong to the metamorphic rocks; *i.e.* they were not originally as we now see them, but owe their present characters to one of the two processes just described. By many observations, all over the globe, it has been well established that they were originally limestone—a non-crystalline or subcrystalline rock composed of the calcareous remains of organisms, such as molluscs, corals, crinoids, or foraminifera. In many cases limestones show even to the naked eye the forms of their component organic remains, or else, as in chalk, these are easily seen with the microscope. Again, these are so much broken up by various processes, such as their mutual attrition in the water in which they lived and died, that but little remains of their organic structure. Here the rock is fine-grained and compact to the eye, and even under the microscope shows only a confused mass of small translucent grains which have little definite action on polarized light.

When, however, limestones have been subjected to metamorphic action, a striking change is observed. The more complete the metamorphism, the more the organic forms tend to disappear, and the larger and clearer become the grains, until the final product—marble—is seen to consist of interlocking grains of clear, colorless, transparent calcite. These grains are crossed by many fine straight lines and bands due to cleavage and a peculiar crystalline structure known as twinning, and they exert a strong and definite effect on polarized light. The non-calcareous portions of the limestone are also changed. In white marble the carbonaceous organic matter has been destroyed, while in the gray and black varieties, much of it is left in minute diffused particles which give the color to the mass. The other constituents have crystallized,—the iron oxide to hematite or limonite, and other substances into various minerals, as mica and garnet.

The limestones from which marbles have been made have

been formed (with some exceptions) from organic growths.¹ The molluscs, corals, etc., have flourished, died, and their remains have been broken up, year after year, at the bottom of seas, estuaries, or lakes, which were often of vast extent. Through changes in the surrounding land surface, fresh water might flow into the salt sea or estuary, or *vice versa*, the sea might be mingled with fresh lake-water, either event inducing a change in the fauna on the bottom. Or again, through freshets or the breaking away of some barrier, silt or sand might be brought down into previously clear water, destroying some organisms, and mingling its mineral constituents with the more purely calcareous remains of living beings. Such changes might alternate, or the general course of life remain uniform for long periods; but eventually the beds would be covered, hardened, and perhaps raised and changed by metamorphism into crystalline marble.

From this brief sketch several facts are evident. In the first place, deposits of marble may be found in any region where the proper conditions—organic and inorganic—have obtained. In the next place, they may vary in thickness from a few inches to thousands of feet, and in area from hundreds of square yards to hundreds of square miles. Again, these masses may be uniform throughout their extent, or they may vary in character within comparatively short distances. Again, since the organisms, or at least the substances of which their remains are composed, together with the smaller amounts of sand and silt which may be mixed with them, are much the same the world over, and since the processes by which the beds were laid and consolidated were also much the same, it is evident that we may expect to find closely similar, if not indistinguishable, rocks in different localities. We may find similar uniform beds, or we may find similar differences in the characters of near-by beds, in each place.

¹ There is still some discussion as to this, several authors considering many of the limestones to have been formed by chemical precipitation. This, however, would have no effect on the general line of argument, as will be seen.

The matter is both complicated and simplified by the influence of metamorphism. It is complicated because the results of this action are not always the same, while varying between rather narrow limits in the case of the rocks under discussion. These depend on many conditions, such as the amount of pressure, the thickness and size of the beds, their geological position, temperature, presence or absence of water, etc. In the case of local metamorphism, the limestone is more and more marmorized the nearer we approach the igneous centre, so that near this mass we may get a perfectly crystalline, statuary marble, while a short distance away the rock may preserve the indeterminate character of limestone. In regional metamorphism, also, parts of the mass may be much more altered than others, as is well seen, for instance, in the Vermont marble region. But these varying conditions of metamorphism are, like the varying conditions of deposition, much the same the world over; none of them are peculiar to Greece, Italy, or any other region, so that they do not invalidate in the least the general conclusion of the last paragraph, that similar rocks are to be expected in different localities.

But, on the other hand, metamorphism also simplifies the matter. Its tendency, at least in the case of marbles, is to obliterate original differences.¹ The definite and easily recognized forms of the organic remains and the bedded structure become lost in marble in a mass of irregular calcite grains. Where, before, the palaeontologist could have determined the genera and species of the individuals nothing is left but clear, colorless, angular particles and grains. Occasionally evidences of the bedding are to be traced in layers of micaceous material, which give a tendency to the marble to split along definite planes, as is seen in some Pentelic marbles, and in such varieties as the Carystian used for the columns of the temple of Antoninus and Faustina in Rome. But even these are much con-

¹ This tendency is well exemplified in other metamorphic rocks, as schists and gneisses, where, in many cases, it is impossible to determine whether the original rock was igneous or sedimentary.

torted, and are often due to pressure and not to bedding. This tendency towards homogeneity is unfortunate for the purposes of the archaeologist, because since each region has its own fairly well defined and peculiar fauna, if their remains were preserved, the palaeontologist would be of immense assistance in determining provenance.

But there is still another factor making for uniformity, one already briefly noted, but which should be emphasized. This is the simplicity of the chemical composition of limestones and of their successors, the marbles. They are essentially carbonate of lime, occasionally with notable quantities of carbonate of magnesia, but with other substances, as silica, alumina, and oxides of iron, in comparatively small amount. This is especially true of statuary marbles, which are all nearly chemically pure calcium carbonate.

The above considerations, it is true, are generally applicable to marbles, but, it must be remarked that we do find instances of marbles from certain localities which have no known analogues, and whose provenance can be predicated with a fair degree of safety. These are the colored and "fancy" marbles. With the great differences of color and of brecciated or veined structure which these present, there is an almost infinite number of recognizable varieties, and in these cases we are not left in much doubt as to where the block in question was quarried, if we know where quarries furnishing such rock exist, or above all, if we know that such quarries were worked in antiquity. But these marbles are exceptional, and only in comparatively late and unimportant periods of art were used for sculpture. Their use was mainly architectural, and with such material we have little to do here.

Coming back to statuary marbles we see that the field has been greatly narrowed. It is evident that *a priori* we may expect to meet with identical marbles coming from diverse localities. It may be urged, however, that possibly there are differences, slight indeed, but still discernible, which will enable us to distinguish between two marbles — say a Pentelic and a

Parian. From the simplicity of chemical and mineralogical composition the possibility of distinctive chemical¹ and mineralogical² differences may be dismissed at the outset, and we have to fall back on physical differences. From what has preceded it is manifest that such differences in statuary marbles will be small, even between extreme types; to the naked eye a difference in the size or translucency of grain, both within very narrow limits, slight differences in the manner of weathering, a difference in the tone, whether a slightly bluish or a yellowish white, and such small matters.

It soon becomes evident to any one examining marbles from this point of view, if he is not satisfied with haphazard guesses (for many of the so-called identifications deserve no better name), that some means must be employed which will enable us to study the minuter characters of the specimen. This means is furnished us by the microscope and the methods of modern petrography, which may be briefly described before we touch upon what they reveal to us and discuss the identificatory value of the revelations.

In order to study a rock under the microscope, it is necessary, not merely to polish one surface, but to employ a slice, or section, made as thin as possible, in order that light may be transmitted through it. This is accomplished by grinding down flat chips on both sides, by means of emery, first on iron plates or wheels, and then on glass, and finally mounting with Canada balsam on glass slides. The process is laborious and requires considerable manual dexterity; but when successful, the resulting rock section is not more than two or three hundredths of a millimetre in thickness, and, except for opaque

¹ Lepsius (*op. cit.* p. 18) states that Pentelic marble is distinguished from all other Greek marbles through its content of iron oxide—his analysis showing 0.12 per cent. On p. 33, however, he states that the Dolianá marble has the same amount as Pentelic. The coincidence of figures is, of course, pure chance, but any one acquainted with rock analyses knows that the impurities in such cases are always variable, even in the same mass, and not at all distinctive.

² Lepsius's remarks on the identificatory value of quartz grains and a bituminous odor are of interest in this connection. (*Op. cit.* pp. 18-19.) He points out that these are of no use for the purpose of identification.

minerals, is translucent, and in places transparent. In such sections powers of from thirty to one hundred diameters, which are generally used, reveal the minute structural and other characteristics, and, with the aid of polarized light, the component minerals may be definitely and accurately determined.

Now, what do we find to be the characters of various marbles when thus examined? Lepsius has described the appearance of various Greek marbles in the paper already cited, and additional details, as well as photographic reproductions, may be found in another of his works.¹ But that the archaeologist may understand the matter more fully, as well as for the sake of completeness, it may be worth while to go into the matter with some detail. To aid in the descriptions, drawings are annexed of various types of microscopic structure met with among statuary marbles; but these are necessarily crude and diagrammatic, and fail to reproduce the delicacy and detail of the originals. It must be premised, however, that these descriptions and drawings convey but very imperfect and inadequate ideas of what is seen by the eye, and it may be urged that an hour spent in looking over the sections of marble and limestone of some geological or petrographical *confrère* will be amply repaid, by giving one a just idea of the possibilities and limitations incident to such an investigation.

Let us begin with the most crystalline marble, such as the best Parian (Fig. 1). This is wholly composed of fairly uniform grains of clear, colorless calcite, which average 1 mm. to 2 mm. in diameter, though a few run up to 3 mm. and even 5 mm. The grains are of irregular shape, and definite, straight-edged crystal outlines are wanting. They "inter-lock," *i.e.* they abut against each other closely, leaving no vacant space, and the projections and concavities of one grain fit snugly into corresponding concavities and projections of the adjacent grains. This is what is called a uniform, granular structure, and might be compared with polygonal masonry laid

¹ Lepsius, *Geologie von Attika*, Berlin, 1893.

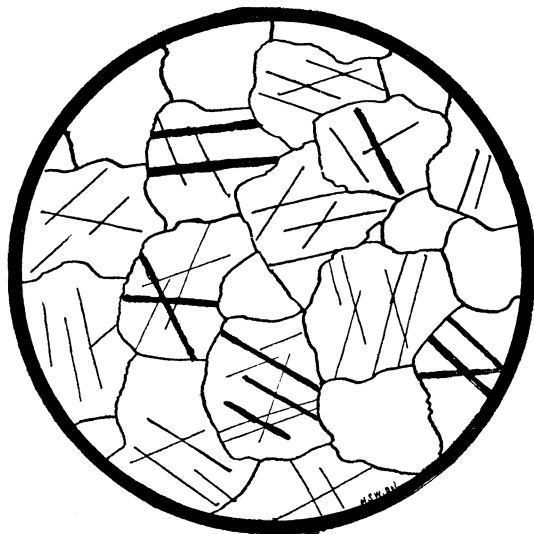


FIGURE 1. — PARIAN MARBLE. *Ordinary Light.* $\times 20$.



FIGURE 2. — PARIAN MARBLE. *Polarized Light.*

without mortar. In the best "lychnites" the grains of calcite are free from impurity, but in the poorer kinds of Parian marble they include small specks of dark iron ore and other substances, the total amount of these being very small. The calcite grains are traversed by fine straight lines, due to cleavage (splitting) along certain planes, and in polarized light are seen to be divided into parallel light and dark bands,—the twinned structure already mentioned,—both of these being largely due to the pressure causing the metamorphism. If the sections are of the proper tenuity, brilliant colors are seen in polarized light; but in general the sections are not thin enough, and the colors are shades of bright gray (Fig. 2).

In the next figure (Fig. 3) we see a section of Lower Pentelic marble. This shows also some large, clear grains, together with smaller, less clear ones. But these last are not arranged in streaks, but are scattered more or less uniformly among the larger ones, thus breaking up the light, and giving to Pentelic marble its whiter color and less degree of transparency as compared with Parian. This structure might be roughly compared with polygonal masonry, with small stones fitted in the crevices between the larger.

In another example (Fig. 4) we find much the same thing, only here the large, clear grains are few and scattered widely through a mosaic of small ones, the structure being what is called porphyritic.

In the finest-grained marbles we find the large calcites fewer still in number and the fine-grained mosaic largely preponderating, until in the limestones proper we get only a confused aggregate of minute grains of calcite, showing no cleavage or twinning, and with impurities much more abundant. In the less changed limestones, finally, we see the actual organic remains embedded in a fine calcareous mud.

It must be remarked that the types figured here are extreme, or rather distinctive of several of the prominent structures met with. They are not separated in nature as sharply as might be supposed from the few and distinct examples given, but grade

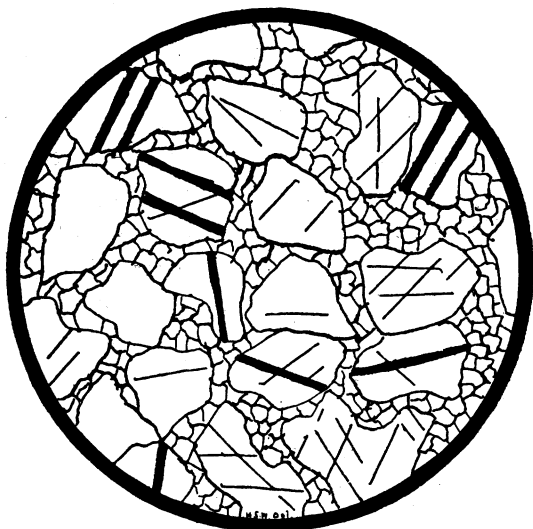


FIGURE 3.—PENTELIC MARBLE. *Ordinary Light.* $\times 20$.

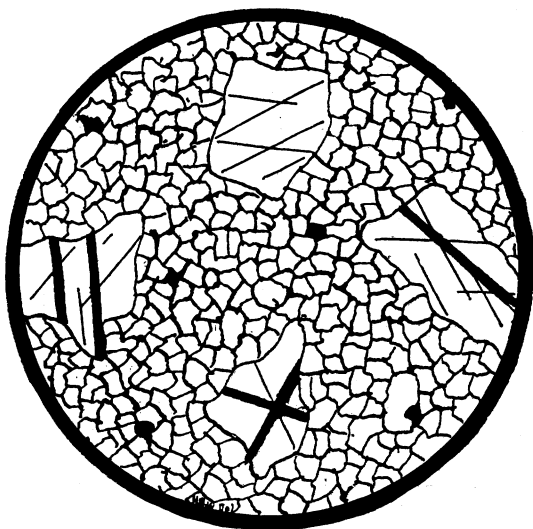


FIGURE 4.—MARBLE OF PORPHYRITIC STRUCTURE. *Ordinary Light.* $\times 20$.

into one another, often in the same rock mass, through innumerable and diverse transition forms.

From the above description, however inadequate, the reader will gather that the physical differences between one marble and another are neither very great nor very distinctive. It is evident also that they are not fundamental, but are due to the variation of conditions in intensity or degree rather than in kind, when we find that these structures are not separable into hard and fast groups, but grade into one another. This is true whether we examine many specimens from various localities, or suites of specimens from the same mass. The greater part of Parian marble belongs to the first-described type, but some marbles from Paros, according to Lepsius, possess other characters. At the quarries of Mt. Pentelicus, most of the marble is of a structure similar to that shown in Fig. 3, but here again we find in places coarse-grained varieties which much resemble some Parian.¹

But the characters of any marble are not peculiar to itself or to the locality, — no marble is *sui generis*, — but they all may be, and in many cases demonstrably are, the characteristics of marbles from other localities. This is the keynote of this paper, and the basis on which I put in a plea for greater caution in our methods and judgments when dealing with this question. We are not dealing here with the products of human activity or human intelligence, so infinitely varied, each with its own individuality and capacity of impressing some of its marks on its followers; nor with fauna and flora, distinctive of the region which has produced them through the manifold and complex conditions of their existence; but we are dealing with inanimate masses, among the simplest of the rocks of the globe, whose characters vary only within narrow limits, and which are the products of comparatively few and simple forces and conditions that duplicate themselves at times and in many places.

It is a matter of very great regret to me that I cannot, at present, bring before the reader any specific instances to clinch

¹ Lepsius, *Marmorstudien*, p. 16.

the matter ; cases where, for instance, marbles from two widely distant localities are identical and indistinguishable the one from the other. As I do not possess an adequate collection of material illustrating the subject, I can only discuss the matter from general geological principles. These, it is true, would naturally not appeal to the archaeologist as strongly as to the geologist, and are, therefore, less convincing than the citation of specific instances would be. In so far as this is true, my object is unattained ; but, that archaeologists may judge for themselves of the weight of such general principles, I may cite an instance in the domain of petrography outside of marbles.

This, the most striking which has come to my notice, and one which has an important archaeological and ethnological bearing, is the investigation by Clarke and Merrill¹ of objects of jadeite and nephrite in the United States National Museum. The examinations were made both chemically and petrographically on a rich variety of objects from Alaska, Mexico, Central America, Siberia, Switzerland, New Zealand, and other places. They found that, both chemically and mineralogically, nephrites from Alaska, Switzerland, New Zealand, New Caledonia, and Siberia were practically indistinguishable, and the same held good for jadeite from Mexico, Costa Rica, and Burmah. Their conclusions, as far as they relate to the subject under discussion, are worthy of being quoted in full :²

“ As regards the possibility of distinguishing by means of thin sections and the microscope between nephrites from various sources, a majority of the authorities consulted (and among them are those who have devoted much time to the subject, and who, having critically examined a large number of slides, are capable of rendering opinions of value) appear to favor the view that this is practicable. As for ourselves, with our present experience, we confess to a feeling of scepticism. The presence or absence of enclosures of diopside, magnetite, or ferru-

¹ Clarke and Merrill, ‘On Nephrite and Jadeite,’ *Proc. U. S. Nat. Mus.*, 1888, p. 115.

² Clarke and Merrill, *op. cit.* p. 129.

ginous oxides, the condition of these oxides, whether ferric or ferrous, the varying tufted, bent, confused fibrous and even granular condition of the constituent parts, are all, together with the color variations and other structural peculiarities, matters of too slight import to be of weight from a petrographic standpoint. If, as seems possible, the majority of the nephrites are of secondary origin, why may we not expect to find all, or at least a great variety, of the structures described in the same or closely adjacent rock masses? Chemical analysis on samples from near-lying, or even the same, localities are often found to vary as greatly as those from localities widely separated. Why may we not expect the same structural variations when once they are carefully looked for? To our own minds sufficient assurance that the widely scattered jadeite and nephrite objects were derived from many independent sources, and possess no value whatever in the work of tracing the migration and intercommunication of races, lies in the fact that these substances are comparatively common constituents of metamorphic rocks, and hence liable to be found anywhere where these rocks occur. Their presence is as meaningless as would be the finding of a piece of graphite. The natives required a hard, tough substance capable of receiving and retaining a sharp edge and polish, and took it wherever it was to be found."

Another example, in the writer's experience, is that of certain lavas of Aegina and Methana, which so closely resemble some of those from our western states that it is practically impossible to tell them apart, even by the microscope. Indeed, many instances of the sort might be given, and so generally is this recognized that only in exceptional cases would a petrographer venture to name the locality of a given specimen of rock.

In the foregoing pages the subject has been treated in a general way, and the conclusion is that, speaking broadly, no very positive or trustworthy information as to source can be obtained from the examination of the material of sculptures. But there is another and less general aspect, the consideration of which must not be neglected.

In dealing with the works of art of any ancient peoples, such as the Greeks and Romans, our horizon is notably contracted by several considerations. In the first place, the possible number of localities of material is limited by the geographical extensions of these races, and their connections, commercial and military. In the next place, we can assume as natural that for most works of art suitable material from near-by localities would be used rather than from those at a distance. This would hold true especially of the less important objects and of the more humble artists. A third and important consideration is that certain marbles, — often more fashionable, — as *par excellence* the Parian, were favorites with sculptors, who would use these, even if they had to be imported at considerable expense, in preference to marbles nearer to hand.

In examining, then, the material of any given statue, with the object of determining whence the material was derived, all these facts must be taken into consideration. The known facts as to the provenance of the statue itself would have great influence on our conclusions and their probable correctness.

If we are dealing, as Lepsius was, with works of art largely of no great importance at the time of their creation, and nearly all from localities in the neighborhood of extensively worked quarries, the problem is greatly simplified, and our conclusions fairly trustworthy. If the characters of the marbles of the Attic tomb reliefs agree with those of the known Pentelic quarries, or that of many of the archaic female figures of the Acropolis with that of Paros, or that of the pediment figures from the temple of Athena Alea with that of the ancient quarries at Dolianá, we can feel reasonably safe in drawing the conclusion that these works were made of marble from these quarries. They are the natural sources in each case, and if the characters agree, our chain of reasoning is strong, though by no means perfect.

But it is a different matter when we are dealing with statues of unknown ultimate provenance, (as is the case with the majority of the sculptures in the European museums out-

side of Greece,) or from localities in the neighborhood of which no white marble is quarried. For instance, in the case of the Satyr of the Louvre already cited (page 2), which was found on the Palatine, are we justified in asserting with Brunn that it is Parian, or with Furtwängler that it is "possibly Thasian, but certainly not Parian"? Again, Furtwängler is, according to the views expressed above, expressing himself more strongly than the facts warrant, when he says of the Medici Torso,¹ "Zunächst ist der Marmor nicht . . . carrarisch, sondern, wie schon Bötticher und Michaelis sahen, pentelisch, und zwar sind die Eigenschaften des pentelischen Marmors an vielen Stellen *so unverkennbar*, dass nach dieser Richtung *gar kein Zweifel mehr bestehen kann*. Es ist ein gewaltiger, ausgesucht schöner Block pentelischen Materiales."

No information is given by any of these authorities which leads us to believe that any examination other than a superficial one was made of the material, and the fact is that in such cases we are launched on a sea of conjecture, where the petrographer is of little use to the archaeologist. On the one hand we have the known facts that certain marbles were highly prized and most used by the ancients, and also often that the characters of the material of our statue agree — at least superficially — with those of one of the well-known varieties. On the other hand, we know that many other districts than Paros, Mt. Pentelicus, Carrara, etc., furnished marbles which were also used to a certain (and generally unknown) extent — at least locally. Some of these localities we know, while of others we are absolutely ignorant. Furthermore, the examination of Greek and Roman statues, from this point of view, has never been, with the exception of Lepsius's work, of such a character as to justify any confidence in its results; and lastly, even were such difficult, tedious, and minute examinations made in each case by specialists, they would furnish us with little safe basis for argument, for the reasons set forth in the preceding pages.

The outcome of the present discussion, then, is, that all argu-

¹ Furtwängler, *Intermezzi*, p. 18. The italics are mine.

ments based on the evidence furnished by examination of the material of sculptures should be received with the greatest caution. Such evidence should only be produced after careful petrographical examination and comparison both of the sculpture itself and of all the possible quarries available whence such marble might come. Its value at best, even in such cases as those of the Attic tomb reliefs or the Tegean pediment figures, is but corroborative of the evidence of style, technique, etc., which furnish the safest basis on which to build arguments as to the provenance of the finished object. The importance and reliability of these grow with the increase of our knowledge, while, unfortunately, as our knowledge of the ancient marbles and their quarries increases, just so much does the uncertainty of our deductions therefrom increase.

HENRY S. WASHINGTON.

LOCUST, N.J.